Lösungen Analysis
E+M 10 / 11

Ueb 1

a

```
0
```

b

```
0
```

c

```
0
```

Ueb 2

```
(x^x)^x (x + x Log[x] + Log[x^x])
```

Ueb 3

```
x^(-1+x+x^x) (1 + x Log[x] + x Log[x]^2)
```

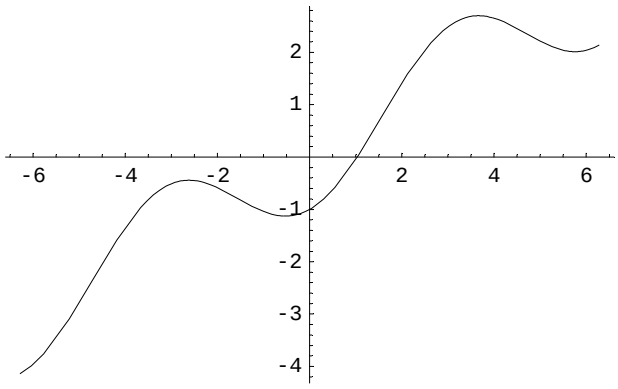
Ueb 4

```
1/2 + Sin[x]
```

```
Cos[x]
```

$$\left\{\left\{x \to -\frac{\pi}{6}\right\}\right\}$$

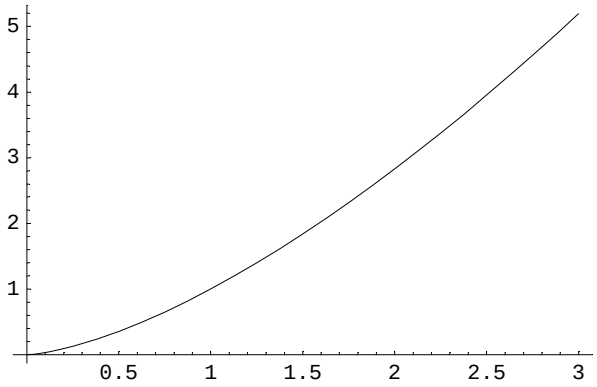
$$\left\{\left\{x \to -\frac{\pi}{2}\right\}, \left\{x \to \frac{\pi}{2}\right\}\right\}$$



Ueb 5

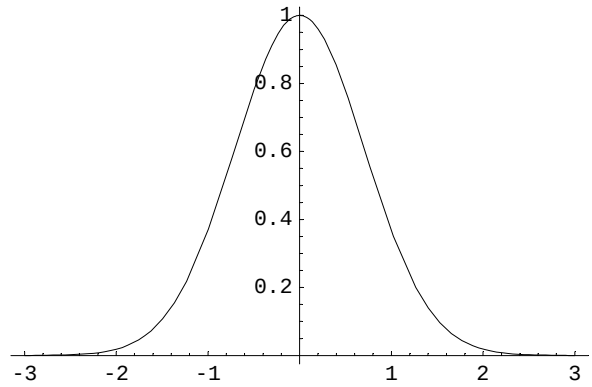
$$\frac{3\sqrt{x}}{2}$$

$$\{\{x \to 0\}\}$$



Ueb 6

$$-2\, e^{-x^2}\, x$$



```
Solve[D[f5[x], x] == 0, {x}]
```

$$\{\{x \to 0\}\}$$

$$-2\, e^{-x^2} + 4\, e^{-x^2}\, x^2$$

$$\left\{\left\{x \to -\frac{1}{\sqrt{2}}\right\}, \left\{x \to \frac{1}{\sqrt{2}}\right\}\right\}$$

$$\{\{x \to -0.707107\}, \{x \to 0.707107\}\}$$

Ueb 7

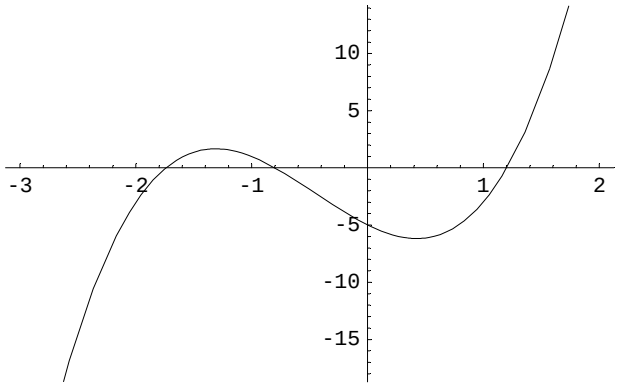
$$-5 + 8\, x + 9\, x^2$$

$$\left\{\left\{x \to \frac{1}{9}\left(-4 - \sqrt{61}\right)\right\}, \left\{x \to \frac{1}{9}\left(-4 + \sqrt{61}\right)\right\}\right\}$$

$$\{\{x \to -1.31225\}, \{x \to 0.423361\}\}$$

$$\left\{\left\{x \to -\frac{4}{9}\right\}\right\}$$

$$\{\{x \to -0.444444\}\}$$



Ueb 8

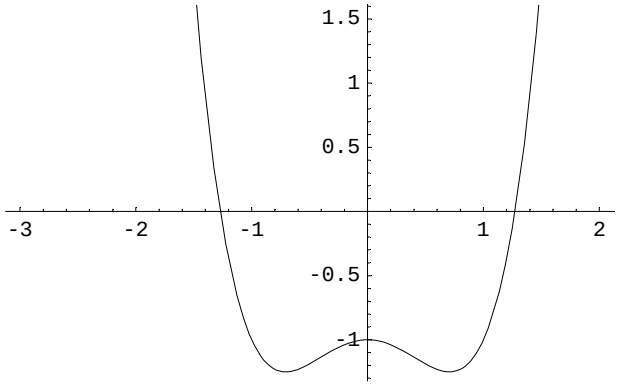
$$-2\, x + 4\, x^3$$

$$\left\{\{x \to 0\}, \left\{x \to -\frac{1}{\sqrt{2}}\right\}, \left\{x \to \frac{1}{\sqrt{2}}\right\}\right\}$$

$$\{\{x \to 0.\}, \{x \to -0.707107\}, \{x \to 0.707107\}\}$$

$$\left\{\left\{x \to -\frac{1}{\sqrt{6}}\right\}, \left\{x \to \frac{1}{\sqrt{6}}\right\}\right\}$$

$$\{\{x \to -0.408248\}, \{x \to 0.408248\}\}$$



Ueb 9

```
Sin[b + x]
```

```
Cos[x] Sin[b] + Cos[b] Sin[x]
```

```
Sin[b + x] == Cos[x] Sin[b] + Cos[b] Sin[x]
```

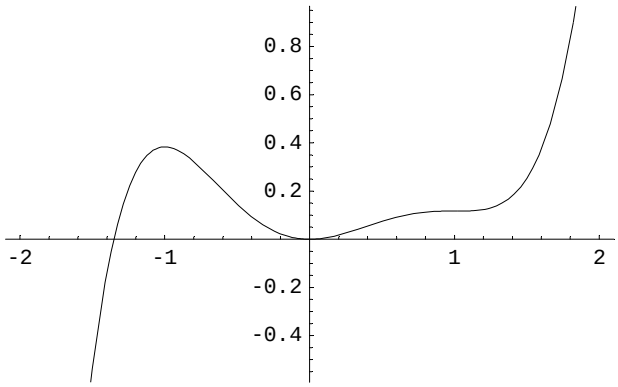
```
Cos[b + x] == Cos[b] Cos[x] - Sin[b] Sin[x]
```

Additionstheoreme / Théorèmes d'addition

Ueb 10

a

$$\frac{x^2}{2} - \frac{x^3}{3} - \frac{x^4}{4} + \frac{x^5}{5}$$

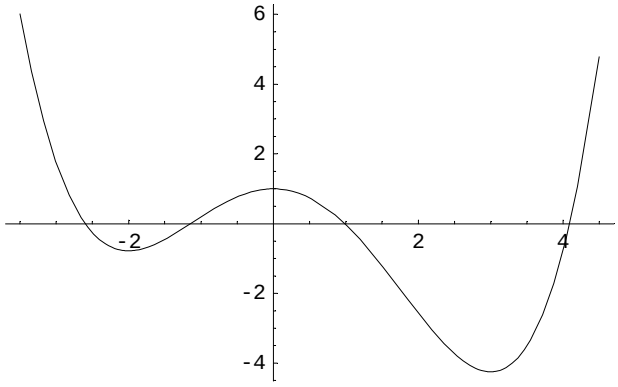



```
x - x^2 - x^3 + x^4
```

```
{{x → -1}, {x → 0}, {x → 1}, {x → 1}}
```

b

$$1 - x^2 - \frac{x^3}{9} + \frac{x^4}{12}$$

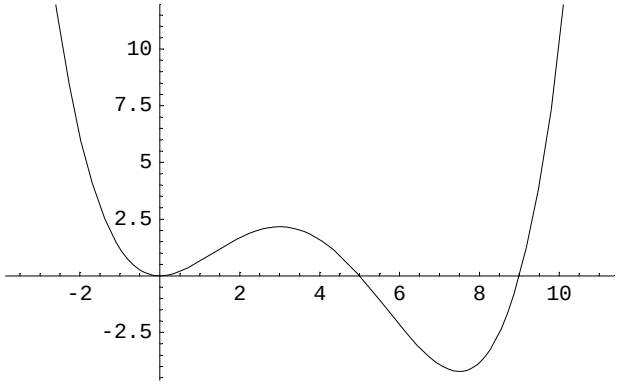


$$-2\,x - \frac{x^2}{3} + \frac{x^3}{3}$$

$$\{\{x \to -2\}, \{x \to 0\}, \{x \to 3\}\}$$

c

$$\frac{1}{50}\,(-9+x)\,(-5+x)\,x^2$$



$$\frac{1}{25}\,(-9+x)\,(-5+x)\,x + \frac{1}{50}\,(-9+x)\,x^2 + \frac{1}{50}\,(-5+x)\,x^2$$

$$\left\{\{x \to 0\}, \{x \to 3\}, \left\{x \to \frac{15}{2}\right\}\right\}$$

Ueb 11

Remove[a]

$a\,(-5+x)\,x$

$-6.25\,a$

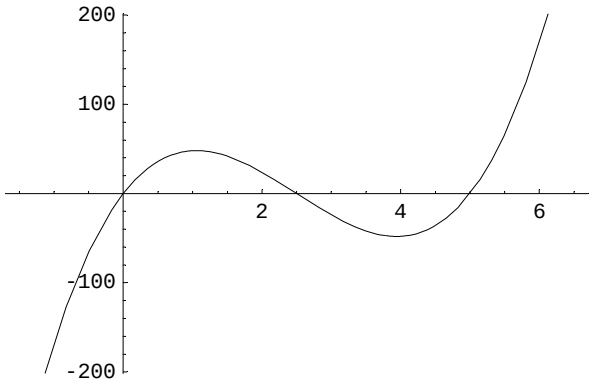
$\{a \to -4.\}$

$-4.$

$20.\,x-4.\,x^2$

$-4.\,(5-2\,x)\,(-5+x)\,x$

$100.\,x-60.\,x^2+8.\,x^3$



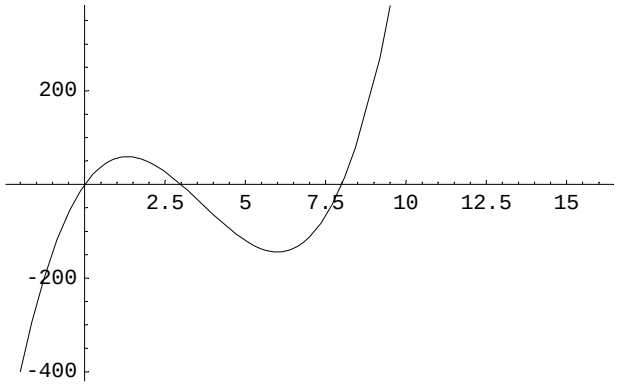
$100.-120.\,x+24.\,x^2$

$\{\{x \to 1.05662\},\{x \to 3.94338\}\}$

$\left\{\left\{x \to \frac{5}{6}\left(3-\sqrt{3}\right)\right\},\left\{x \to \frac{5}{6}\left(3+\sqrt{3}\right)\right\}\right\}$

Ueb 12

$96\,x-44\,x^2+4\,x^3$



$96-88\,x+12\,x^2$

$$\left\{\left\{x \to \frac{4}{3}\right\}, \{x \to 6\}\right\}$$

```
{{x → 1.33333}, {x → 6.}}
```

Ueb 13

```
2 x1
```

```
-4 + 2 x2
```

```
{x2 → 2 + x1}
```

```
2 x x1 - x1^2
```

```
8 + 2 x x1 - 4 x2 - 2 x1 x2 + x2^2
```

```
x1 == 1
```

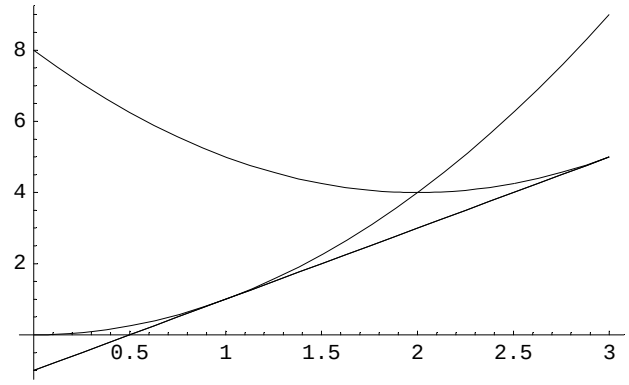
```
{x1 → 1}
```

```
1
```

```
1
```

```
3
```

```
5
```



Einfachere Lösung (Der 2. Graph entsteht durch Verschiebung des 1.):

```
2 x1
```

```
-4 + 2 x2
```

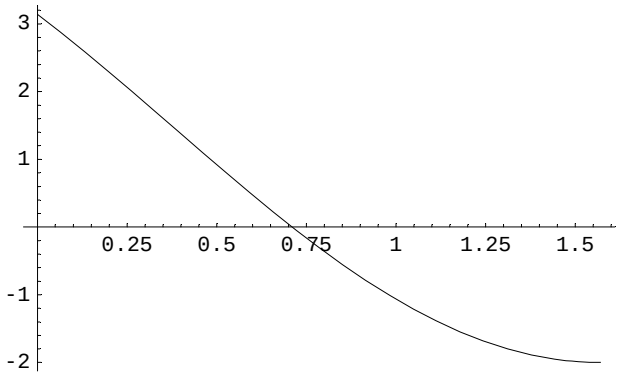
```
2 + x1
```

```
-2 + 4 x1
```

```
{x1 → 1}
```

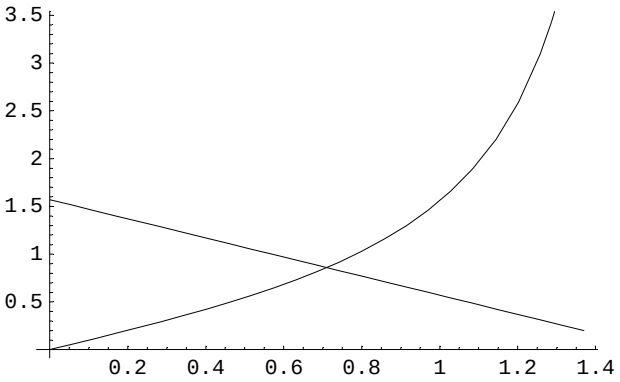
Ueb 14

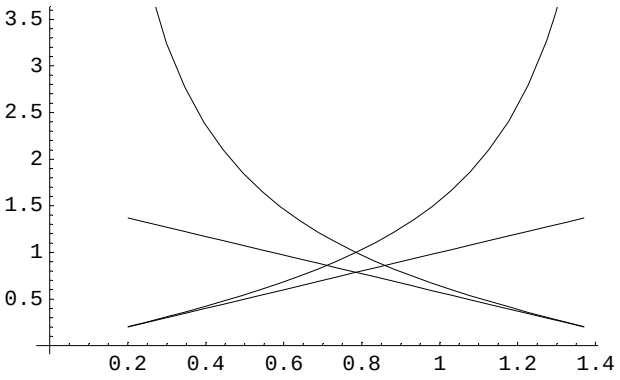
```
(π - 2 x0) Cos[x0] - 2 Sin[x0]
```



$$2\,(x0 + \text{Tan}[x0]) == \pi$$

$$\frac{\pi}{2} - x0 == \text{Tan}[x0]$$





$\{x0 \to 0.710463\}$

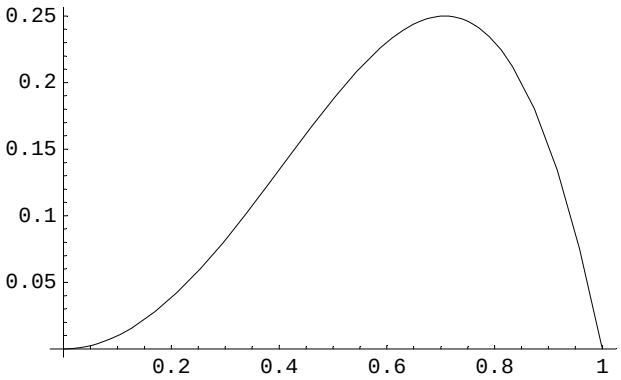
Ueb 15

$x^2 - x^4$

$2\,x - 4\,x^3$

$\left\{\{x \to 0\}, \left\{x \to -\frac{1}{\sqrt{2}}\right\}, \left\{x \to \frac{1}{\sqrt{2}}\right\}\right\}$

$\{\{x \to 0.\}, \{x \to -0.707107\}, \{x \to 0.707107\}\}$


0.25
0.2
0.15
0.1
0.05
0.2
0.4
0.6
0.8
1